



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

June 22, 2021

AIRFRAME AND ENGINE EXAMINATION

WPR19TA245

This document contains 6 embedded photos.

A. ACCIDENT

Location: North Las Vegas, NV
Date: August 27, 2019
Aircraft: Bell 47G
NTSB IIC: Fabian Salazar

B. EXAMINATION PARTICIPANTS:

Name: Fabian Salazar, IIC
National Transportation Safety Board
Federal Way, WA 98001

C. SUMMARY

Examination of the airframe and engine occurred on February 25, 2020, at Air Transport Recovery facility, Phoenix, AZ. Examination of the airframe revealed no evidence of preimpact mechanical malfunction or failures that would have precluded normal operation. Examination of the engine revealed two cracked intake valve springs in the number one cylinder.

D. DETAILS OF THE INVESTIGATION

CABIN. Examination of the cabin area revealed no anomalies. Flight controls were observed in both pilot stations.

FLIGHT CONTROL CONTINUITY

Flight control continuity was established from all the flight controls to the flight control surfaces. The flight controls were color coded with paint. The collective components were painted green, the cyclic fore and aft components were painted red, and the cyclic lateral components were painted blue.

Collective. Control continuity was established from the collective out to the green collective hydraulic servo bracket. The green bracket had fractured.

Cyclic, Fore and Aft Control. Control continuity was established from the cyclic fore and aft to the red cyclic fore and aft hydraulic servo bracket. The blue bracket had fractured.

Cyclic Lateral control. Control continuity was established from the cyclic lateral control to the blue cyclic lateral hydraulic servo bracket. The blue bracket had fractured.

Tail Rotor Pedals. Control continuity was established from the pedals to the ends of the two tail rotor control cables. The cables displayed cuts made during the recovery process.

Landing Gear. The landing gear, consisting of two cross tubes and two skids, were damaged during the accident. The two cross tubes remained attached to the fuselage. The two skids separated from the cross tubes at impact.

Fuselage. The fuselage was damaged consistent with ground impact. The acrylic dome windscreen was cracked but remained attached to the fuselage. The acrylic doors remained attached at their hinges. The truss tail boom was damaged and distorted. The tail boom was cut into two halves for recovery.

Main rotor system. The main rotor system was damaged. Both main rotor blades contacted the ground while under rotation bending and distorting the blades throughout their span. The hub remained attached to the mast and the mast remained attached to the transmission. The transmission remained partially attached to the fuselage.

The tail rotor assembly separated from the tailboom at the gearbox. The gearbox casing fractured exposing the gears. No oil remained in the gearbox. The tail rotor driveshaft remained attached to the tailboom at the hangar bearings.

ENGINE

The engine remained intact and attached to the airframe of the helicopter. All major components of the engine remained attached at their respective mounting points.

The carburetor was drained and about one ounce of bluish colored fluid with the smell and appearance of aviation gasoline was present.

The magnetos were examined, and all six posts sparked on both magnetos.

The spark plugs were removed and examined. All spark plugs display normal coloration. None of the 12 sparkplugs had the copper washer installed. That is the sparkplugs were installed on the engine without copper washers.

The number one cylinder did not produce a strong compression stroke when the engine was turned by hand, in comparison with the other cylinders. All other cylinders displayed a good thumb force compression.

The number one cylinder, intake valve springs were found fractured into two pieces each. The cylinder was removed from the engine and examined. The number one intake valve was removed with difficulty due to a sharp edge that had formed at the valve where the two valve keepers are

securing the valve to the assembly. The intake valve did not give the appearance of providing a strong seal. The valve displayed a clean ring where it contacted the ring seal. The ring seal did not display a clean smooth edge.

The number three cylinder was removed from the engine to compare the number three exhaust valve and ring seal to the number one valve and ring seal. The number three valve displayed a dry presentation on the valve stem compared to the wet appearance of the number one valve stem. The number three exhaust ring valve displayed a dry smooth pattern where the valve contacted the ring seal compared to the wet rough pattern of the entire ring seal on the number one ring valve seat.

PHOTO GALLERY



Figure 1. N6064H, right-side view.



Figure 2. N6064H, left-side view.



Figure 3. Tail rotor assembly and 90° gearbox.



Figure 4. Top and bottom spark plugs.



Figure 5. Number one intake valve springs compared to number three intake valve spring.



Figure 6. Number one intake valve springs showing fractures on both springs.